

ENERGY EFFICIENCY/RENEWABLE ENERGY IMPACT IN THE TEXAS EMISSIONS REDUCTION PLAN (TERP)

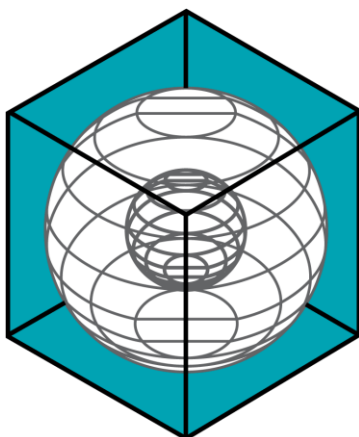
VOLUME III—TECHNICAL APPENDIX

**Annual Report to the
Texas Commission on Environmental Quality
January 2009-December 2009**



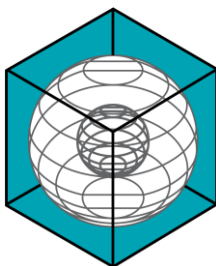
Jeff Haberl, Ph.D., P.E.; Charles Culp, Ph.D., P.E.
Bahman Yazdani, P.E.; Zi Liu, Ph.D.; Juan-Carlos Baltazar-Cervantes, Ph.D.,
Don Gilman, P.E, Cynthia Lewis, Kathy McKelvey,
Jaya Mukhopadhyay. Larry Degelman, P.E.

December 2010



ENERGY SYSTEMS LABORATORY

**Texas Engineering Experiment Station
Texas A&M University System**



ENERGY SYSTEMS LABORATORY

Texas Engineering Experiment Station
Texas A&M University System

3581 TAMU
College Station, Texas 77843-3581

December 2, 2010

Chairman Bryan W. Shaw
Texas Council on Environmental Quality
P. O. Box 13087
Austin, TX 78711-3087

Dear Chairman Shaw:

The Energy Systems Laboratory (Laboratory) at the Texas Engineering Experiment Station of the Texas A&M University System is pleased to provide its seventh annual report, "Energy Efficiency/Renewable Energy Impact in the Texas Emissions Reduction Plan (TERP)," as required under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002 (Senate Bill 5, 77R as amended 78 R & 78S).

The Laboratory is required to annually report the energy savings from statewide adoption of the Texas Building Energy Performance Standards in Senate Bill 5 (SB 5), as amended, and the relative impact of proposed local energy code amendments in the Texas non-attainment and near-non-attainment counties as part of the Texas Emissions Reduction Plan (TERP).

Please contact me at (979) 845-1280 should you or any of the TCEQ staff have any questions concerning this report or any of the work presently being done to quantify emissions reduction from energy efficiency and renewable energy measures as a result of the TERP implementation.

Sincerely,

David E. Claridge, Ph.D., P.E.
Director

Enclosure

cc: Commissioner Carlos Rubinstein
Commissioner Buddy Garcia
Executive Director Mark Vickery

Disclaimer

This report is provided by the Texas Engineering Experiment Station (TEES) as required under Section 388.003, (e) (2) (A) & (B) of the Texas Health and Safety Code and is distributed for purposes of public information. The information provided in this report is intended to be the best available information at the time of publication. TEES makes no claim or warranty, expressed or implied that the report or data herein is necessarily error-free. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or favoring by the Energy Systems Laboratory or any of its employees. The views and opinions of authors expressed herein do not necessarily state or reflect those of the Texas Engineering Experiment Station or the Energy Systems Laboratory.

VOLUME III – APPENDIX

Energy Efficiency/Renewable Energy Impact
In The Texas Emissions Reduction Plan

1 EXECUTIVE SUMMARY

The Energy Systems Laboratory (Laboratory), at the Texas Engineering Experiment Station of the Texas A&M University System, in fulfillment of its responsibilities under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002, submits its seventh annual report, Energy Efficiency/Renewable Energy (EE/RE) Impact in the Texas Emissions Reduction Plan to the Texas Commission on Environmental Quality.

The report is organized in three volumes:

- Volume I – Summary Report – provides an executive summary and overview;
- Volume II – Technical Report – provides a detailed report of activities, methodologies and findings;
- Volume III – Technical Appendix – contains detailed data from simulations for each of the counties included in the analysis.

Accomplishments:

1. Energy Code Amendments

The Laboratory was requested by several Council of Governments (COGs) and municipalities to analyze the stringency of several proposed residential and commercial energy code amendments, including: the 2003 and 2006 IECC and the ASHRAE Standards 90.1-2001 and 90.1-2004. Results of the analysis are included in the Vol. II—Technical Report.

2. Technical Assistance

The Laboratory provided technical assistance to the TCEQ, PUCT, SECO, ERCOT, and several political subdivisions, as well as Stakeholders participating in improving the compliance of the Texas Building Energy Performance Standards (TBEPS). The Laboratory also worked closely with the TCEQ to refine the integrated NOx emissions reduction calculation procedures that provide the TCEQ with a standardized, creditable NOx emissions reduction from energy efficiency and renewable energy (EE/RE) programs, which are acceptable to the US EPA. These activities have improved the accuracy of the creditable NOx emissions reduction from EE/RE initiatives contained in the TERP and have assisted the TCEQ, local governments, and the building industry with effective, standardized implementation and reporting.

3. NOx Emissions Reduction

Under the TERP legislation, the Laboratory must determine the energy savings from energy code adoption and, when applicable, from more stringent local codes or above-code performance ratings, and must report these reductions annually to the TCEQ. Figure 1 shows the cumulative NOx emissions reduction through 2020 for the electricity and natural gas savings from the various EE/RE programs.

In 2009, the OSD NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 6.56 tons-NOx/day (16.1%), savings from retrofits to Federal buildings is 0.51 tons-NOx/day (1.3%), savings from furnace pilot light retrofits is 0.32 tons-NOx/day (0.8%), savings from the PUC's Senate Bill 5 and Senate Bill 7 programs is 4.39 tons-NOx/day (10.8%), savings from SECO's Senate Bill 5 program is 0.95 tons-NOx/day (2.3%), electricity savings from green power purchases (wind) are 21.79 tons-NOx/day (53.5%), and savings from residential air conditioner retrofits are 6.19 tons-NOx/day (15.2%). The total NOx emissions reduction from all programs is 40.71 tons-NOx/day.

By 2013, the NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 1,541 tons-NOx/year (8.0% of the total NOx savings), savings from retrofits to Federal buildings will be 308 tons-NOx/year (1.6%), savings from furnace pilot light retrofits will be 117 tons-NOx/year (0.6%), savings from the PUC's Senate Bill 5 and Senate Bill 7 programs will be 2,355 tons-NOx/year (12.1%), savings from SECO's Senate Bill 5 program will be 373 tons-NOx/year (1.9%), electricity savings from green power purchases (wind) will be 13,065 tons-NOx/year (67.6%), and savings from residential air conditioner retrofits will be 1,574 tons-NOx/year (8.1%). The total NOx emissions reduction from all programs will be 19,313 tons-NOx/year.

By 2013, the OSD NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 8.72 tons-NOx/day (16.1%), savings from retrofits to Federal buildings will be 0.81 tons-NOx/day (1.5%), savings from furnace pilot light retrofits will be 0.32 tons-NOx/day (0.6%), savings from the PUC's Senate Bill 5 and Senate Bill 7 programs will be 6.28 tons-NOx/day (11.6%), savings from SECO's Senate Bill 5 program will be 1.01 tons-NOx/day (1.9%), electricity savings from green power purchases (wind) will be 25.99 tons-NOx/day (48.0%), and savings from residential air conditioner retrofits will be 11.03 tons-NOx/day (20.4%). The total NOx emissions reduction from all programs will be 54.16 tons-NOx/day.

4. Technology Transfer

The Laboratory, along with the TCEQ, is host to the annual Clean Air Through Energy Efficiency (CATEE) conference, which is attended by top experts and policy makers in Texas and from around the country. At the conference the latest educational programs and technology is presented and discussed, including efforts by the Laboratory, and others, to reduce air pollution in Texas through energy efficiency and renewable energy. These efforts have produced significant success in bringing EE/RE closer to US EPA acceptance in the Texas SIP. The Laboratory will continue to provide superior technology to the State of Texas through such efforts with the TCEQ and the US EPA.

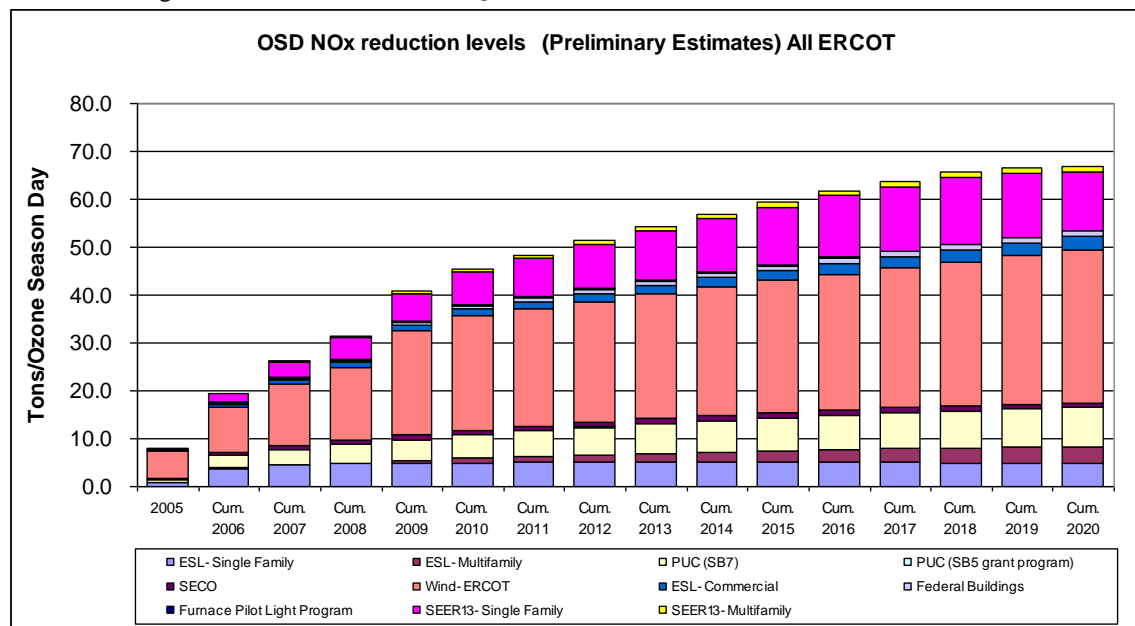


Figure 1: OSD NOx Emissions Reduction Projections through 2020

To accelerate the transfer of technology developed as part of the TERP, the Laboratory has also made presentations at national, state and local meetings and conferences, which includes the publication of peer-reviewed papers. The Laboratory will continue to provide technical assistance to the TCEQ, counties and communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering emissions and improving the air quality for all Texans.

These efforts have been recognized nationally by the US EPA. In 2007, the Laboratory was awarded a National Center of Excellence on Displaced Emissions Reduction (CEDER) by the US EPA so that these accomplishments could be rapidly disseminated to other states for their use. The benefits of CEDER include: reducing the financial, technical, and administrative costs of determining the emissions reduction from EE/RE measures; continuing to accelerate implementation of EE/RE strategies as a viable clean air effort in Texas and other states; helping other states better identify and prioritize cost-effective clean air strategies from EE/RE; and communicating the results of quantification efforts through case-studies and a clearinghouse of information.

The Laboratory will continue to provide technical assistance to the TCEQ, counties and communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering emissions and improving the air quality for all Texans.

If any questions arise, please contact us by phone at 979-458-0675, or by email at terpinfo@tees.tamus.edu.

2 ACKNOWLEDGEMENTS

This work has been completed as a fulfillment of the requirements in Texas Health Code, Senate Bill 5, Section 388.003, and through Senate Bill 20, House Bill 2481 and House Bill 2129, which requires the Laboratory to assist TCEQ in quantifying emissions reductions credits from energy efficiency and renewable energy programs, through a contract with the Texas Environmental Research Consortium (TERC). Similarly, selected Code training workshops were funded by the US DOE through the Texas State Energy Conservation Office (SECO). Partial funding on the Texas Climate Vision project, a joint project with the City of Austin was also provided by the US DOE through SECO.

The authors are also grateful for the timely input provided by the following individuals, and agencies: Mr. Art Diem, US EPA, for providing the eGRID database and Dr. Akin Olubiyi.

Numerous additional individuals at the Laboratory contributed significantly to this report, including: Dr. Dan Turner, Kyle Marshall, Robert Stackhouse, Jason Cordes, Stephen O'Neal, Piljae Im, Sooyeon Cho, Mini Malhotra, and Christina Riddle.

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3 CODE AND PRE-CODE SIMULATION RESULTS BY COUNTY

This appendix to the Laboratory's 2009 Annual report contains the simulation results for single-family and multi-family residences in the 41 counties. For each county, code and pre-code simulation, and annual and peak-day results for individual residence are provided (Single-Family and Multi-Family).

For each county, pre-code and code simulation, and annual and peak day results, for 1999, 2000 and 2002 base year, for individual Single-family and Multi-family residences can be viewed using the links provided in Table 2. For counties other than 41 non-attainment and affected counties, simulations were performed for one representative county per climate zone. The annual and peak day savings for each county were calculated using the simulation results for the representative county for the same climate zone and number of houses.

Table 1: List of Counties

	County	Climate Zone
Affected County	Bastrop	4
	Bexar	4
	Caldwell	4
	Comal	4
	Ellis	5
	Gregg	6
	Guadalupe	4
	Harrison	6
	Hays	5
	Henderson	6
	Hood	5
	Hunt	5
	Johnson	5
	Kaufman	6
	Nueces	3
	Parker	6
	Rockwell	6
	Rusk	5
	San Patricio	3
	Smith	5
	Travis	5
	Upshur	6
	Victoria	3
	Williamson	5
	Wilson	4
Nonattainment County	Brazoria	3
	Chambers	4
	Collin	5
	Dallas	5
	Denton	6
	El Paso	6
	Fort Bend	4
	Galveston	3
	Hardin	4
	Harris	4
	Jefferson	4
	Liberty	4
	Montgomery	4
	Orange	4
	Tarrant	5
	Waller	4

Table 2: Simulation Results for Individual Single Family and Multi Family Residences for All Counties.

Non-attainment or Affected Counties	1999			2000			2002		
	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
BASTROP	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
BEXAR	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
CALDWELL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
COMAL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
ELLIS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
GREGG	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
GUADALUPE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HARRISON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HAYS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
JOHNSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
KAUFMAN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
NUECES	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
PARKER	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
ROCKWALL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
RUSK	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
SAN PATRICIO	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
SMITH	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
TRAVIS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
UPSHUR	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
VICTORIA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
WILLIAMSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
WILSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
BRAZORIA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
CHAMBERS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
COLLIN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
DALLAS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
DENTON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
EL PASO	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
FORT BEND	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
GALVESTON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HARDIN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HARRIS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
JEFFERSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
LIBERTY	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
MONTGOMERY	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
ORANGE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
TARRANT	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
WALLER	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HOOD	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HENDERSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HUNT	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999		2000			2002		
* COLEMAN	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
CALLAHAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
EASTLAND		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
ERATH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
FISHER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HASKELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
JACK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
JONES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
MITCHELL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
NOLAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
PALO PINTO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
SHACKELFORD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
STEPHENS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* TAYLOR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
THROCKMORTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
YOUNG		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* LEON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
* BELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
BOSQUE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
BROWN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
COMANCHE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
CORYELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
FALLS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
FREESTONE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HAMILTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HILL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
LAMPASAS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
LIMESTONE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
MCLENNAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
MILLS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
NAVARRO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
BRISCOE	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
* HALL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* BASTROP		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
CALDWELL	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
LEE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
BLANCO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
BURNET		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
GILLESPIE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
KERR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
REAL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HAYS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
LLANO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
MASON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
SAN SABA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* TRAVIS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
WILLIAMSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999		2000			2002		
* CHAMBERS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
BROOKS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
CAMERON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* HIDALGO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
KENEDY		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
STARR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
WILLACY	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
JIM HOGG		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* ZAPATA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* KLEBERG		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
ARANSAS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* NUECES	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
DUVAL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
JIM WELLS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
LIVE OAK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
SAN PATRICIO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
DIMMIT	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
LA SALLE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
MAVERICK		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
MCMULLEN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* WEBB		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
ZAVALA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
HENDERSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* SMITH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* DALLAS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
ELLIS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HOOD	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
JOHNSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
SOMERVELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
TARRANT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
LAMAR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
RED RIVER	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
* TITUS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
* COLLIN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
DELTA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
DENTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
FRANKLIN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
HOPKINS	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
KAUFMAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
PARKER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
RAINS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
ROCKWALL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
VAN ZANDT	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
WISE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
CULBERSON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* HUDSPETH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily

ERCOT Counties (*Representative counties)		1999		2000		2002	
ANDERSON		Single Family	Multifamily	Single Family	Multifamily	Single Family	Multifamily
ANGELINA		Single Family	Multifamily	Single Family	Multifamily	Single Family	Multifamily
CHEROKEE	Summary	Single Family	Multifamily	Summary	Single Family	Summary	Single Family
HOUSTON		Single Family	Multifamily		Single Family		Single Family
NACOGDOCHES		Single Family	Multifamily		Single Family		Single Family
* RUSK		Single Family	Multifamily		Single Family		Single Family
BRAZORIA	Summary	Single Family	Multifamily	Summary	Single Family	Summary	Single Family
* GALVESTON		Single Family	Multifamily		Single Family		Single Family
AUSTIN		Single Family	Multifamily		Single Family		Single Family
BRAZOS		Single Family	Multifamily		Single Family		Single Family
BURLESON		Single Family	Multifamily		Single Family		Single Family
COLORADO		Single Family	Multifamily		Single Family		Single Family
FAYETTE		Single Family	Multifamily		Single Family		Single Family
FORT BEND		Single Family	Multifamily		Single Family		Single Family
GRIMES	Summary	Single Family	Multifamily	Summary	Single Family	Summary	Single Family
* HARRIS		Single Family	Multifamily		Single Family		Single Family
MADISON		Single Family	Multifamily		Single Family		Single Family
MONTGOMERY		Single Family	Multifamily		Single Family		Single Family
ROBERTSON		Single Family	Multifamily		Single Family		Single Family
WALLER		Single Family	Multifamily		Single Family		Single Family
WASHINGTON		Single Family	Multifamily		Single Family		Single Family
* MILAM	Summary	Single Family	Multifamily	Summary	Single Family	Summary	Single Family
BORDEN		Single Family	Multifamily		Single Family		Single Family
CHILDRESS		Single Family	Multifamily		Single Family		Single Family
CROSBY		Single Family	Multifamily		Single Family		Single Family
DAWSON		Single Family	Multifamily		Single Family		Single Family
DICKENS	Summary	Single Family	Multifamily	Summary	Single Family	Summary	Single Family
KENT		Single Family	Multifamily		Single Family		Single Family
KING		Single Family	Multifamily		Single Family		Single Family
MOTLEY		Single Family	Multifamily		Single Family		Single Family
* SCURRY		Single Family	Multifamily		Single Family		Single Family
STONEWALL		Single Family	Multifamily		Single Family		Single Family
* CRANE		Single Family	Multifamily		Single Family		Single Family
REAGAN	Summary	Single Family	Multifamily	Summary	Single Family	Summary	Single Family
UPTON		Single Family	Multifamily		Single Family		Single Family
ANDREWS		Single Family	Multifamily		Single Family		Single Family
* ECTOR		Single Family	Multifamily		Single Family		Single Family
GLASSCOCK		Single Family	Multifamily		Single Family		Single Family
HOWARD		Single Family	Multifamily		Single Family		Single Family
JEFF DAVIS		Single Family	Multifamily		Single Family		Single Family
LOVING	Summary	Single Family	Multifamily	Summary	Single Family	Summary	Single Family
MARTIN		Single Family	Multifamily		Single Family		Single Family
MIDLAND		Single Family	Multifamily		Single Family		Single Family
REEVES		Single Family	Multifamily		Single Family		Single Family
WARD		Single Family	Multifamily		Single Family		Single Family
WINKLER		Single Family	Multifamily		Single Family		Single Family

ERCOT Counties (* Representative County)		1999		2000		2002						
* ATASCOSA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily			
FRIO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
* BEXAR		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
COMAL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
GONZALES		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
GUADALUPE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
KINNEY		Summary	Single Family		Multifamily	Summary		Single Family	Multifamily	Summary	Single Family	Multifamily
MEDINA			Single Family		Multifamily			Single Family	Multifamily		Single Family	Multifamily
UVALDE			Single Family		Multifamily			Single Family	Multifamily		Single Family	Multifamily
VAL VERDE	Single Family		Multifamily	Single Family	Multifamily		Single Family	Multifamily				
WILSON	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily			
BANDERA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
* KENDALL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
BREWSTER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
EDWARDS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
KIMBLE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
PECOS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
PRESIDIO	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily			
SUTTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
TERRELL		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
CONCHO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
CROCKETT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
IRION		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
MCCULLOCH		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
MENARD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
RUNNELS		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
SCHLEICHER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
* TOM GREEN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
* COKE		Summary	Single Family		Multifamily	Summary		Single Family	Multifamily	Summary	Single Family	Multifamily
STERLING			Single Family		Multifamily			Single Family	Multifamily		Single Family	Multifamily
COOKE		Summary	Single Family		Multifamily	Summary		Single Family	Multifamily	Summary	Single Family	Multifamily
FANNIN	Single Family		Multifamily	Single Family	Multifamily		Single Family	Multifamily				
GRAYSON	Single Family		Multifamily	Single Family	Multifamily		Single Family	Multifamily				
* HUNT	Single Family		Multifamily	Single Family	Multifamily		Single Family	Multifamily				
MONTAGUE	Single Family		Multifamily	Single Family	Multifamily		Single Family	Multifamily				
ARCHER	Single Family		Multifamily	Single Family	Multifamily		Single Family	Multifamily				
BAYLOR	Single Family		Multifamily	Single Family	Multifamily		Single Family	Multifamily				
CLAY	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily			
COTTLE		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
FOARD		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
HARDEMAN		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
KNOX		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
* WICHITA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			
WILBARGER		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily			

ERCOT Counties (* Representative County)		1999		2000		2002			
BEE		Single Family	Multifamily		Single Family	Multifamily	Single Family	Multifamily	
CALHOUN		Single Family	Multifamily		Single Family	Multifamily	Single Family	Multifamily	
GOLIAD		Single Family	Multifamily		Single Family	Multifamily	Single Family	Multifamily	
JACKSON		Single Family	Multifamily		Single Family	Multifamily	Single Family	Multifamily	
MATAGORDA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
REFUGIO		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* VICTORIA		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
WHARTON		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
DE WITT		Single Family	Multifamily		Single Family	Multifamily		Single Family	Multifamily
* KARNES	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily
* LAVACA	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily	Summary	Single Family	Multifamily